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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/716,565	11/20/2000	Evaggelos Geraniotis	2000-0122	7527

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BANNER & WITCOFF LTD.,
ATTORNEYS FOR AT & T CORP
1001 G STREET , N.W.
ELEVENTH STREET
WASHINGTON, DC 20001-4597

EXAMINER	
BAYARD, EMMANUEL	
ART UNIT	**PAPER NUMBER**
2631	7

DATE MAILED: 11/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/716,565	GERANIOTIS ET AL.	
	Examiner	Art Unit	
	Emmanuel Bayard	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11/20/00*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *5*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balachandran et al U.S. Patent No 6,108,374 in view of Chuang et al U.S. Patent No 6,477,210 B2.

As per claim 1, Balachandran et al discloses method for use in a receiver for detecting and demodulating at least one signal of M-ary orthogonal symbols (MOK) comprising the steps of receiving coded M-ary orthogonally modulated symbols over a channel (see figs.11 , 12 element 172, 196 and col.3, lines 64-65 and col.10, lines 34-35 and col.11, lines 14-15); demodulating said M-ary orthogonally modulated symbols (see figs.11, 12 element 174, 198 and col.10, lines 36-40 and col.11, lines 16-17); calculating a metric (see figs. 11, 12 element 176 and col.10, lines 43-46 and col.11, lines 18-27 and col.12, line 50); decoding said symbols (see figs 11, 12 element 174, 198 and col.10, lines 36-40 and col.11, lines 16-17); average metric is functionally equivalent to the claimed (calculating probabilities) of different symbols for each symbol instance (see abstract and figs 11, 12 element 180, 206 and col.3, lines 48-55 and col.10, lines 44-45 and col.11, lines 25-26); estimating a fading channel (see figs. 11, 12 element 182, 208 and col.4, lines 25-28, 55-

58 and col.10, lines 47-56 and col.11, lines 14-35) responsive to calculating the probabilities; and feeding back is functionally equivalent to the claimed (iteratively) feeding said metric, said decoded symbols, said probabilities and said estimate back into modulator symbols coherently (see figs. 11, 12 and col.10, lines 48-55 and col.11, lines 29-35).

However Balachandran does teach iteratively feeding said metric, said decoded symbols, said probabilities and said estimate back into said demodulating step to re-demodulate said symbols coherently.

Chuang et al teaches iteratively feeding said metric, said decoded symbols, said probabilities and said estimate back into said demodulating (see abstract and fig.1 element 160 and col.8, lines 15-45) step to re-demodulate said symbols coherently.

It would have been obvious to one of ordinary skill in the art to implement the teaching of Chuang into Balachandran as to permit joint channel estimation and data decoding with improved channel tracking capability, resulting in reliable link performance even under high user mobility as taught by Chaung (see col.8, lines 43-46).

As per claim 2, Balachandran does include convolutionally coded (see col.4, lines 27-28).

As per claims 3 and 14, Chaung teaches demodulating said signal is performed coherently (see col.1, line 35). Furthermore implementing such teaching into Balachandran would have been obvious to one skilled in the art as to significantly improve the radio link performance as taught by Chaung (see col.15, lines 50-51).

As per claims 4, 5, 16 and 17, it would have been obvious to one of ordinary skill in the art to implement testing the decoded signal for recognition improvement and repeating steps b through f iteratively until no recognition improvement is detected of Chaung into Balachandran as to permit joint channel estimation and data decoding with improved channel tracking capability, resulting in reliable link performance even under high user mobility as taught by Chaung (see col.8, lines 43-46).

As per claim 6, Chaung teaches the step of de-interleaving (see fig.1 element 175). Furthermore implementing such teaching into Balachandran would have been obvious to one skilled in the art as improve the demodulation performance at all time during the iterative process.

As per claims 7 and 8, Balachandran does include a log likelihood ratio (see abstract).

As per claim 9, it would have been obvious to one of ordinary skill in the art to implement calculating chip probabilities after the step of calculating symbol probabilities into Balachandran as to provide accurate signal quality feedback in terms of SNR to the demodulator.

As per claims 10, 11, 18 and 19, Balachandran does include using a filter.

As per claims 12 and 20, it would have been obvious to one of ordinary skill in the art to implement estimating step is performed in a first instance using only a known first chip and following a first instance of said decoding unknown chips being also used to estimate the fading channel into Balachandran as to provide accurate signal quality feedback in terms of SNR to the demodulator.

As pre claim 13 Balachandran teaches method for a receiver for detecting and demodulating at least one signal of complementary code keying (CCK) symbols comprising the steps of: receiving M-ary is equivalent to the claimed (complementary coded keying) (CCK) modulated symbols over a channel (see figs.11 , 12 element 172, 196 and col.3, lines 64-65 and col.10, lines 34-35 and col.11, lines 14-15); demodulating said complementary code keying modulated symbols (see figs.11, 12 element 174, 198 and col.10, lines 36-40 and col.11, lines 16-17); decoding said symbols (see figs 11, 12 element 174, 198 and col.10, lines 36-40 and col.11, lines 16-17);average metric is functionally equivalent to the claimed (calculating probabilities) of different symbols for each symbol instance (see abstract and figs 11, 12 element 180, 206 and col.3, lines 48-55 and col.10, lines 44-45 and col.11, lines 25-26); calculating expected values of complex conjugates of every chip (see col.4, lines 12-28); estimating the fading channel at different chip positions within said symbol (see figs. 11, 12 element 182, 208 and col.4, lines 25-28, 55-58 and col.10, lines 47-56 and col.11, lines 14-35); iteratively feeding said decoded symbols, said probabilities and said estimate back into modulating symbol (see figs. 11, 12 and col.10, lines 48-55 and col.11, lines 29-35).

However Balachandran does teach adding an extra known chip at a beginning of every symbol and iteratively feeding said metric, said decoded symbols, said probabilities and said estimate back into said demodulating step to re-demodulate said symbols coherently.

Chuang et al teaches adding an extra known chip at a beginning of every symbol (see fig.1 and col.8, lines 20-21 and col.20, line 53) and iteratively feeding said metric, said decoded

symbols, said probabilities and said estimate back into said demodulating (see abstract and fig.1 element 160 and col.8, lines 15-45) step to re-demodulate said symbols coherently.

It would have been obvious to one of ordinary skill in the art to implement the teaching of Chuang into Balachandran as to permit joint channel estimation and data decoding with improved channel tracking capability, resulting in reliable link performance even under high user mobility as taught by Chaung (see col.8, lines 43-46).

As per claim 15, Balachandran would include determining an argument of a maximum of said signal and a value of said maximum signal, further determining a plurality of first bits of a cod and independently differentially demodulating remaining bits of said code as to permit joint channel estimation and data decoding with improved channel tracking capability, resulting in reliable link performance even under high user mobility.

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Tellado et al U.S. Patent No 6,314,146 B1 teaches peak to average power ratio.

Herzog U.S. Patent No 6,473,417 B1 teaches a method and apparatus for interference cancellation.

Hui et al U.S. Patent No 6,359,935 B1 teaches a method for iterative demodulation..

Park et al Pub No 2002/0186798 A1 teaches an apparatus and method for channel encoding/decoding.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Bayard whose telephone number is (703) 308-9573. The examiner can normally be reached on Monday-Thursday from 8:00 AM - 5:30 PM. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad H. Ghayour , can be reached on (703) 306-3034. The fax phone number for this Group is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 305-3800.

Emmanuel Bayard

Primary Examiner

November 14, 2003